Chapter Three: Habitat, Fish, and Wildlife

Contents

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This chapter describes the habitats and various fish and wildlife living in or near the Copper River basin study area.

A. Terrestrial and Aquatic Habitat

Habitats that support natural resources within the study area include upland vegetation communities, and wetlands and aquatic systems. These habitats support the wide diversity of wildlife species discussed in Section B of this Chapter.

1. Vegetation Communities

The Copper River basin lies within a nearly continuous belt of boreal forest, often referred to as the taiga ecosystem, that extends from Alaska across Canada to the Atlantic Ocean. Recurring wildfire is the most prominent and important natural force for maintaining the ecological integrity, diversity, and productivity of the boreal forest (Viereck and Little, 1972). Unlike coastal forests, trees and shrubs of the boreal forest need this disturbance to create suitable sites for new seedlings to establish and grow. Without this disturbance, the forest matures and becomes increasingly spruce-dominated, soils cool and become less productive, and wildlife becomes less diverse and abundant. Trees and shrubs in this area have the potential to live 75 to 200 years, depending on the species, but any given site generally burns about once every 100 years and few areas escape burning long enough for vegetation to become decadent. Most acreage is burned during years of warm, dry weather, which generally occurs about once or twice every decade. The interaction of a severe climate, repeated fires, discontinuous permafrost, and braided drainage systems has resulted in complex vegetation patterns (Selkregg, 1974).

The forest system includes two main forest types: lowland spruce hardwood and bottomland spruce-poplar (Selkregg, 1974). The first system is primarily revegetated through fire and secondary successional processes and the second by primary succession. The study area also supports smaller areas of upland spruce hardwood forest, moist tundra, low bush bog and muskeg, and high bush. Generally, three geomorphic factors control forest development in the vicinity of the study area: slope, aspect, and proximity to fluvial processes.

Lowland spruce-hardwood forests cover approximately 80 percent of this region, and are dominated by extensive stands of black spruce (Picea mariana), with some balsam poplar (Populus balsmifera), quaking aspen (Populus tremuloides), and paper birch (Betula papyrifera). Tamarack (Larix laricina) is often associated with black spruce in wet lowlands. This forest type grows on shallow peat soils, glacial deposits, outwash plains, intermountain basins, lowlands, and north-facing slopes.

Bottomland spruce-poplar forests are typically found in permafrost-free areas along broad floodplains of meandering streams and rivers, such as the Copper River, and on deeply-thawed south-facing slopes of river valleys. This forest community primarily consists of white spruce (Picea glauca) with varying amounts of balsam poplar. Only about 10 percent of the study area supports this forest type. The understory of this community usually consists of dense brush of green alder (Alnus crispa), thinleaf alder (A. tenuifolia), willows

(Salix spp.), prickly rose (Rosa acicularis), Labrador tea (Ledum spp.), and bunchberry (Cornus canadensis). Grasses, forbs, and mosses are common on the forest floor.

Shrub communities in the Copper River basin occur both as floodplain thickets on major streams and rivers, and in the higher elevations as birch-alder-willow communities in the transition zone between forest and alpine tundra. The riparian thickets on river floodplains consist primarily of willow and alder (Alnus spp.). The brush communities at the timberline consist of shrub birch (Betula glandulosa), dwarf birch (Betula nana), bog blueberry (Vaccinium uliginosum), thinleaf alder, green alder, and several species of willow.

Bogs and muskegs occur in low-lying, wet areas on old, poorly-drained floodplains and in the higher elevations of stream drainages. These are typically low shrub communities with varying amounts of sedges and mosses, and are usually classified as wetlands. A list of plant species commonly found in the Copper River basin is presented in Table 3.1.

2. Wetlands and Aquatic Habitat

Wetlands and deepwater habitats within the Copper River basin have been mapped by the National Wetlands Inventory based on the classification system by Cowardin et al. (1979). Approximately 40 percent of the Copper River basin is comprised of wetlands (USFWS, 1994). Wetlands and deep water systems within the study area include riverine (rivers and streams), lacustrine (lakes and large ponds), and palustrine (non-tidal wetlands dominated by woody plants or emergent vegetation).

Streams and rivers classified under the riverine systems include the wetted portion of these waterbodies. Within the study area, riverine habitats include the: Gulkana River, Gakona River, Tazlina River, Copper River, Kutina River, Chistochina River, and any small tributaries. The primary functions of these wetlands are to moderate floodflow, maintain water quality, and provide habitat for fish and wildlife. Riverine systems also are important for subsistence, recreation, and sport fishing for local residents.

Lacustrine systems include natural and man-made lakes more than 20 acres in size, including the largest lakes. Within the study area, lacustrine systems include: Susitna Lake, Lake Louise, Fish Lake, Ewan Lake, Crosswind Lake, Salmon Berry Lake, Twin Lakes, and Gametrail Lake among others. Freshwater aquatic vegetation is found in the shallow water areas of the ponds and lakes and consists of: yellow pond lily (Nuphar polysepalum), white water lily (Nymphaea tetragona), pondweeds (Potomageton spp.), and mare's tail (Hippuris spp.). Aquatic vegetation functions to provide important habitat for both fish and wildlife species. These include birds, such as loons, waterfowl, and shorebirds, as well as mammals, such as muskrat, beaver, river otter, and mink. The areas also provide feeding habitat for moose during summer. Lacustrine systems also are important for subsistence, recreation, and sport fishing for local residents.

Palustrine wetlands include forested wetlands of black spruce and scrub-shrub (bogs and muskegs) dominated by dwarf trees, tall shrubs, or low shrub species. Black spruce forests and woodlands dominate the forested wetlands of the study area. These cover types are typically found along the upper margins of wet areas adjacent to lakes or ponds or in poorly-drained pockets. Black spruce communities support an understory of alder, prickly rose, Laborador tea, and low shrubs, such as lowbush cranberry (Vaccinium vitis-idaea) and bunchberry. Scrub-shrub bogs are often dominated by ericaceous shrubs, such as Laborador tea, bog rosemary (Andromeda polifolia), and bog blueberry, and have a heavy moss component. Sweetgale (Myrica gale) is also a major shrub species in these habitats.

Table 3.1 Common Plant Species of the Study Area

Vegetation Type	Common Name	Scientific Name
Trees and shrubs	Paper birch	*Betula papyrifera*
	Shrub birch	*Betula glandulosa*
	Dwarf birch	*Betula nana*
	Black spruce	*Picea mariana*
	White spruce	*Picea glauca*
	Black cottonwood	*Populus trichocarpa*
	Balsam poplar	*P. balsamifera*
	Quaking aspen	*Populus tremuloides*
	Thinleaf alder	*Alnus tenuifolia*
	Sitka alder	*Alnus sinuata*
	Green alder	*Alnus crispa*
	Willows	*Salix spp.*
	Laborador tea	*Ledum spp.*
	Highbush cranberry	*Viburnum edule*
	Lowbush cranberry	*Vaccinium vitis-idaea*
	Bog blueberry	*Vaccinium uliginosum*
	Black crowberry	*Empetrum nigrum*
	Shrubby cinquefoil	*Potentilla fruticosa*
	Sweetgale	*Myrica gale*
	Bog rosemary	*Andromeda polifolia*
	Devil's club	*Echinopanax horridum*
	Prickly rose	*Rosa accicularis*
	False azalea	*Menziesia ferruginea*
	Red elder	*Sambucus callicarpa*
	Red current	*Ribes triste*
	Red raspberry	*Rubus idaeus*
	Cloudberry	*Rubus chamaemorus*
	Tamarack	*Larix laricina*
	Bunchberry	*Cornus canadensis*
Grasses and Forbs	Bluejoint reedgrass	*Calamagrostis canadensis*
	Fireweed	*Epilobium angustifolium*
	Twinflower	*Trientalis europaea*
	Wintergreen	*Pyrola spp.*
	Oak fern	*Gymnocarpium dryopteris*
	Lady fern	*Athyrium filix-femina*
	Bunchberry	*Cornus canadensis*
	Meadow horsetail	*Equisetum arvense*
	Woodland horsetail	*Eqisetum silvaticum*
	Cow parsnip	*Heracleum lanatum*
	Cattails	*Typha latifolia*
Aquatic Plants	Yellow pond lily	*Nuphar polysepalum*
	White water lily	*Nymphaea tetragona*
	Mare's tail	*Hippuris spp.*
	Pondweeds	*Potomageton spp.*
	Sedges	*Carex spp.*
	Water sedge	*Carex aquatilis*
Sources: Viereck and Little, 1972; Hulten, 1968; Selkregg, 1974		

Palustrine emergent wetland areas are found in areas of standing water and support several species of sedges and grasses. Water sedge (Carex aquatilis) and bluejoint reedgrass (Calamagrostis canadensis) are dominant species in the slightly elevated areas. Emergent wetland vegetation often occurs at the edges of ponds or lakes.

Other palustrine wetlands include thinleaf alder thickets and mesic herbaceous grass meadows dominated by bluejoint reedgrass. These latter wetlands generally occur as small, isolated pockets throughout ground and terminal moraines as a result of depressions from glacial scars and kettles.

Wetlands within the license area serve to provide important aquatic and riparian habitats for fish, waterfowl, and other wildlife; sources for groundwater discharge and nutrient export; recreational and subsistence use; and contribute to regional ecological diversity.

B. Fish and Wildlife Populations

The following sections present a general overview of fish and wildlife present within the Copper River basin study area.

1. Fish

Numerous species of anadromous and freshwater fish occur within and near the Copper River portion of the study area. Species of primary importance in the study area include: king, sockeye, and coho salmon; steelhead; lake and rainbow trout; grayling; burbot; and whitefish. Dolly Varden also occur in this area in relatively low numbers. Table 3.2 identifies stream and lake systems known to support fish populations, and the species that occur in each. Twenty-one of these systems are classified as anadromous streams or lakes, and 19 support runs of king, coho, and/or sockeye salmon. Detailed information on critical habitats is limited (ADF&G, 1998; Howe et al., 1998; Morstad et al., 1998; Alaska, 1982). Important fish habitat is depicted in Figure 3.1.

Table 3.2 Documented Anadromous and Freshwater Fish Streams and Lakes in the Study Area

Lake/Stream/Creek	*Species Present*
Susitna Lake	grayling, lake trout, burbot, whitefish
Lake Louise	grayling, lake trout, burbot, whitefish
Little Lake Louise	grayling, lake trout, burbot, whitefish
Tyone Lake	grayling, lake trout, burbot, whitefish
Crosswind Lake [1]	sockeye salmon, grayling, lake trout, burbot, whitefish
Beaver Lake	grayling, lake trout, burbot, whitefish
Dog Lake	sockeye salmon, grayling, lake trout, burbot
Moose Lake	grayling
Tolsona Lake	grayling, burbot
Deep Lake	grayling, lake trout, burbot
Tazlina Lake [1]	King salmon, sockeye salmon, grayling, lake trout, rainbow trout, burbot, whitefish, steelhead
Old Man Lake [1]	sockeye salmon
Caribou Lake [2]	grayling
Connor Lake [2]	grayling
Elbow lake [2]	grayling

Table 3.2 Documented Anadromous and Freshwater Fish Streams and Lakes in the Study Area	
Lake/Stream/Creek	*Species Present*
Forty Foot Lake [2]	grayling
Crater Lake [2]	rainbow trout, arctic char
DJ Lake [2]	rainbow trout
Forgotten Lake [2]	grayling
Gergie Lake [2]	rainbow trout
Little Crater Lake [2]	rainbow trout
Buffalo Lake [2]	coho salmon
Arizona Lake [2]	grayling
Junction Lake [2]	grayling
Little Junction Lake [2]	grayling
North Jans Lake [2]	rainbow trout
South Jans Lake [2]	landlocked salmon
Old Road Lake [2]	rainbow trout
Peanut Lake [2]	rainbow trout
Round Lake [2]	rainbow trout
Ryan Lake [2]	rainbow trout
Tex Smith Lake [2]	rainbow trout
Tiny Lake [2]	rainbow trout
Tolsona Mountain Lake [2]	rainbow trout
Copper River [1]	king salmon, sockeye salmon, coho salmon, steelhead
Gulkana River [1]	king salmon, sockeye salmon, grayling, lake trout, steelhead, burbot, whitefish
Klutina River [1]	king salmon, sockeye salmon, grayling, lake trout, steelhead, Dolly Varden, rainbow trout, whitefish
Gakona River [1]	king salmon
Mendeltna Creek [1]	king salmon, sockeye salmon, grayling, rainbow trout
Chistochina River [1]	king salmon, sockeye salmon
Tonsina River [1]	king salmon, sockeye salmon, coho salmon
Cache Creek	graying
Tolsona Creek [1]	king salmon, sockeye salmon, grayling
Tazlina River [1]	king salmon, sockeye salmon, steelhead
Kaina Creek [1]	king salmon, sockeye salmon, steelhead
Dry Creek [1]	king salmon
Bear Creek [1]	king salmon
Sinona Creek [1]	king salmon
Tulsona Creek [1]	king salmon
Dog Creek [1]	king salmon
Spring Creek [1]	king salmon, sockeye salmon
Durham Creek [1]	steelhead
8 Mile Creek [1]	Steelhead
Notes: 1 = Anadromous stream/lake	
2=ADF&G stocked lake	
Sources: Alaska, 1982; Burcrer et. al., 1983; Baer, 1997; ADF&G, 1998; Howe et. al., 1997 and 1998	

Spawning migration occurs at various times of the year, depending on the species. King salmon spawn between June and mid-August, while sockeye and coho salmon spawn from August through October (Alaska, 1982). Lake trout and whitefish are fall spawners, burbot spawn under the ice during winter, and grayling and rainbow trout spawn during the spring. In addition to the natural fish populations, 22 lakes in the proposed license area have been stocked with grayling, coho salmon, and/or rainbow trout (Table 3.2). Tables 3.3 and 3.4 identify salmon spawning streams within the study area that are routinely surveyed.

Table 3-3 Aerial Survey Indices of Chinook Salmon Escapement to the Upper Copper River, 1985-1997[1]

Location	Yearly Survey Indices													10 year Average[2] 1985-1994
	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	
East Fork Chistochina	360	618	764	684	740	615	865	NC	—	508	NC	2,050	2,245	582
Gulkana River	321	3,182	1,228	967	1,993	1,356	1,303	NC	1,156	1,682	NC	2,321	2,250	1,384
Mendeltna Creek	26	76	10	17	185	320	305	NC	126	121	NC	370	350	127
Kiana Creek	91	328	80	249	344	411	520	NC	65	430	NC	723	455	2,608
St. Anne Creek	15	182	192	62	90	42	115	NC	—	250	NC	117	900	107
Manker Creek	22	251	141	115	165	41	101	NC	—	75	NC	192	466	103
Grayling Creek	58	224	112	161	72	49	151	NC	—	2	NC	164	330	94
Little Tonsina River	203	424	247	75	65	57	54	NC	—	4	NC	45	55	137
Indiana River	14	29	33	0	3	15	18	NC	—	47	NC	207	270	18
Total Survey Index	1,110	5,314	2,807	2,330	3,657	2,906	3,432	NC	1,347	3,119	NC	6,189	7,321	2,812

Notes:
1 = The escapement figures in this table are based on peak aerial survey estimates and weir counts from a majority of the known spawning areas in the upper Copper River drainage. These indices are not intended to provide a true estimate of total escapement for these stocks, but a comparable index based upon the best data currently available. An effort has been made to standardize the estimate across years; however, counts were obtained only as environmental conditions allowed and may not necessarily correspond to periods of peak abundance. Missing counts are generally a result of bad weather, high water, turbulence or other factors that prevented surveys for that given year.
2 = Escapement counts from 1985 through 1994 are considered to be most representative of the average returns for the Upper Copper River for the years listed.
NC = Not comparable, surveys were conducted late due to poor weather conditions.
— = No aerial survey conducted.

Source: Morstad et al., 1995
Morstad et al., 1998
M. Fink, 2000

Table 3-4 Aerial Survey Indices of Sockeye Salmon Escapement to the Upper Copper River Drainage, 1983-1997[1]

Location[1]	Yearly Survey Indices															10-Year Average[2] 1983-1992
	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	
Fish Lake	5,500	10,950	3,750	8,750	9,530	6,800	6,700	3,600	4,350	4,250	—	—	—	4,800	—	6,418
Bad Crossing 1 & 2	2,000	760	1,125	5,300	2,575	2,075	3,025	6,050	2,625	500	—	—	—	780	—	2,604
Suslota Lake	5,600	700	2,200	1,300	970	550	525	750	210	1,350	—	—	—	4,100	—	1,416
Dickey Lake	135	105	290	43	360	57	28	28	56	46	—	—	—	0	—	115
Keg Creek	620	2,505	825	200	400	360	1,450	160	95	630	—	—	—	850	420	725
Mahlo Creek	2,400	4,300	575	1,750	2,350	3,900	4,600	2,600	3,750	250	—	—	—	3,800	11,800	2,648
St. Anne Creek	9,700	10,300	1,250	4,600	6,980	6,100	3,100	1,700	4,700	450	—	—	—	3,500	4,800	4,888
Fish Creek Mentasta	900	900	1,800	1,100	250	650	1,500	1,000	1,050	480	—	—	—	480	—	963
Swede Lake	550	2,400	250	385	113	230	275	120	110	875	—	—	—	20	—	531
Tana River	2,485	3,665	1,145	1,825	472	2,034	245	89	750	740	—	—	—	—	—	1,345
Mentasta Lake	6,800	4,850	3,850	2,850	1,800	4,300	3,270	2,900	1,550	600	—	—	—	2,800	—	3,277
Tanada Lake	4,300	9,100	5,900	3,960	4,950	2,100	2,550	1,650	1,725	2,250	—	6,270	3,100	—	—	3,849
Salmon Creek	1,550	1,350	575	300	1,150	700	425	350	350	1,500	—	—	—	—	—	825
Paxon Inlt-Mud Creek	7,500	15,700	7,500	7,000	4,250	6,350	3,200	2,850	4,800	6,450	—	—	—	16,800	—	6,560
Mud Creek and Lake	470	270	200	70	0	150	0	35	100	425	—	—	—	240	—	172
Mendeltna Creek	2,850	1,900	2,300	3,325	2,275	1,550	2,000	3,700	3,050	1,750	—	—	—	1,250	400	2,470
Paxson Lake Outlet	3,300	4,100	3,600	1,810	5,100	3,200	900	1,350	2,300	950	—	—	—	—	—	2,661
Mud Creek-Summit Lake	5,700	9,600	8,150	3,375	9,050	15,400	6,800	2,950	9,625	3,800	—	—	—	—	—	7,445
Long Lake	5,600	1,360	590	1,300	1,225	1,125	1,225	1,950	—	1,050	—	—	—	—	—	1,577
Tonsina Lake	2,850	975	290	350	740	650	2,450	1,450	—	1,350	—	—	—	—	—	1,080
TOTALS	70,810	85,790	46,165	49,593	54,540	58,281	44,268	35,282	41,196	29,696	—	6,270	3,100	39,420	17,420	51,569

Notes: 1 = The escapement figures in this table are based on peak aerial survey estimates and weir counts from a majority of the known spawning areas in the upper Copper River drainage. These indices are not intended to provide a true estimate of total escapement for these stocks, but a comparable index based upon the best data currently available. An effort has been made to standardize the estimate across years, however, counts were obtained only as environmental conditions allowed and may not necessarily correspond to periods of peak abundance. Missing counts are generally a result of bad weather, high water, turbulence or other factors that prevented surveys for that given year.

2 = Escapement counts from 1983 through 1992 are considered to be most representative of the average returns for the Upper Copper River for the years listed.

— = No survey flown.

Source: Morstad et al., 1993

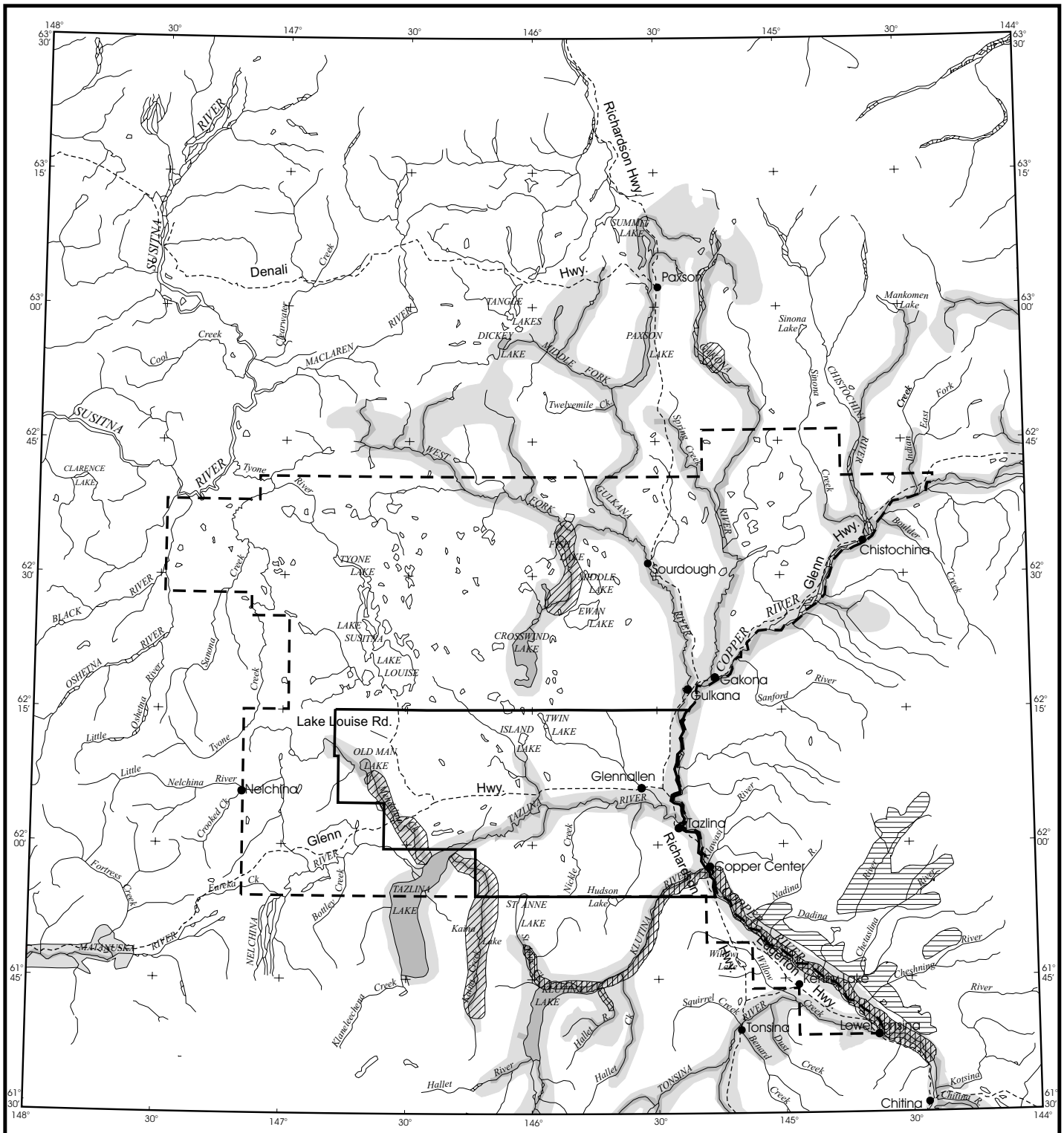

FIGURE 3.1 Important Anadromous Fish, Bear and Bison Habitat

Study Area = ▭ License Area = ▭

Anadromous Fish Species:

Documented Presence = (In stream or lake.)

Watershed Areas =

Source: ADF&G 1985.

Known Concentration Areas:

Black Bear = } (Along streams and intensive use areas.)

Brown-Grizzly Bear = }

Bison (Range) =

Source: ADF&G, 1973
Selkregg, 1975
M. Fink, 2000

ADNR 9/99
Revised 4/00

Overwintering areas also constitute critical habitat for fish species present throughout the year. Larger river systems, deep lakes, and areas near natural springs provide the majority of overwintering habitats. Smaller tributaries and shallow lakes often do not support fish populations during the winter due to icing, low oxygen levels, or lack of food. Specific overwintering areas within the study area have not been documented, but are likely to be present (Alaska, 1982).

King, sockeye, and coho salmon are anadromous, meaning they spend part of their life cycle in the ocean and then spawn in freshwater (ADF&G, 1994). Each of these salmon species dies shortly after spawning. Fertilized salmon eggs deposited during the summer and fall hatch in early spring of the following year. Newly hatched fish, called alevins, live in the gravel for several weeks while they gradually absorb the food in their yolk sac. Once these juveniles, called fry, have emerged from the gravel, they live for one to four years in freshwater, feeding on insects and plankton before migrating to the ocean. Seaward migrants are called smolts. Outbound migration occurs in spring and summer for king and sockeye and in the summer and fall for coho. These salmon species spend between one and five years at sea before returning to freshwater (ADF&G, 1994).

Steelhead trout is a rainbow trout that has spent part of its life at sea. Unlike salmon, steelhead commonly spawn more than once (ADF&G, 1994). After spawning, steelhead return to the sea to replenish lost fat reserves. Eggs deposited in the gravel quickly develop into alevins. By mid-summer, fry emerge from the gravel and will generally remain in the parent stream for 3 years before outmigrating to saltwater during the spring and summer. Steelhead usually enter freshwater to spawn between August and October and return to the ocean shortly after spawning. Smolt may outmigrate during the spring.

Dolly Varden exist as both resident and anadromous varieties within the lakes, streams, and rivers of the area (ADF&G, 1994). Spawning usually occurs in the fall of the year. Juvenile Dolly Varden hatch in early March, but do not emerge from the gravel until April or May. Most Dolly Varden migrate to the ocean in their third or fourth year, but may wait as long as 6 years. Migration usually occurs in mid-summer. The fish overwinter in deep river channels and lakes, and return to spawn in the streams from which they originated.

2. Birds

Bird species likely to be found in the study area are listed in Table 3.5. The Copper River basin provides critical habitat for numerous species of birds. Lakes and wetlands interspersed throughout the area support a wide variety of ducks and high concentrations of trumpeter swans. Generally, waterfowl begin to migrate into the study area during mid- to late April and begin flying south in mid-September or October.

The Copper River basin supports the largest nesting populations of trumpeter swans in Alaska. During surveys conducted in 1995, 3,577 adult trumpeter swans were observed in this region (Conant et al., 1996). The trumpeter swan population has steadily increased since 1975, indicating that swans have responded favorably to management practices designed to protect this particularly sensitive species. Trumpeter swans occur throughout the study area, with especially high nesting concentrations in the Lake Louise vicinity and wetlands to the north (Conant et al., 1996). Important Trumpeter Swan habitat is depicted in Figure 3.2.

Table 3.5 Birds Which Could Occur in the Study Area

Common Name	Scientific Name	Common Name	Scientific Name
Loons/Grebes		*Shorebirds*	
Common Loon	*Gavia immer*	Least Sandpiper	*Calidris minutilla*
Pacific Loon	*Gavia pacifica*	Baird's Sandpiper	*Calidris bairdii*
Red-throated Loon	*Gavia stellata*	Pectoral Sandpiper	*Calidris melanotos*
Red-necked Grebe	*Podiceps grisegena*	Semipalmated Sandpiper	*Calidris pusilla*
Horned Grebe	*Podiceps auritus*	Western Sandpiper	*Calidris mauri*
Waterfowl		Dunlin	*Calidris alpina*
Tundra Swan	*Cygnus columbianus*	Sandhill Crane	*Grus canadensis*
Trumpeter Swan	*Cygnus buccinator*	Semipalmated Plover	*Charadrius semipalmatus*
Greater White-fronted Goose	*Anser albifrons*	Killdeer	*Charadrius vociferus*
Snow Goose	*Chen caerulescens*	Black-bellied Plover	*Pluvialis squatarola*
Canada Goose	*Branta canadensis*	American Golden Plover	*Pluvialis dominica*
Mallard	*Anas platyrhynchos*	Hudsonian Godwit	*Limosa haemastica*
Green-winged Teal	*Anas crecca*	Whimbrel	*Numenius phaeopus*
American Widgeon	*Anas americana*	Greater Yellowlegs	*Tringa melanoleuca*
Eurasian Widgeon	*Anas penelope*	Lesser Yellowlegs	*Tringa flavipes*
Northern Pintail	*Anus acuta*	Solitary Sandpiper	*Tringa solitaria*
Northern Shoveler	*Anus clypeata*	Spotted Sandpiper	*Actitis macularia*
Blue-winged Teal	*Anus discors*	Wilson's Phalarope	*Phalaropus tricolor*
Cinnamon Teal	*Anus cyanoptera*	Red-necked Phalarope	*Phalaropus lobatus*
Canvasback	*Aythya valisineria*	Short-billed Dowitcher	*Limnodromus griseus*
Ring-necked Duck	*Aythya collaris*	Long-billed Dowitcher	*Limnodromus scolopaceus*
Greater Scaup	*Aythya marila*	Common Snipe	*Gallinago gallinago*
Lesser Scaup	*Aythya affinis*	Ruddy Turnstone	*Arenaria interpres*
Barrow's Goldeneye	*Bucephala islandica*	Surfbird	*Aphriza virgata*
Common Goldeneye	*Bucephala clangula*	*Gulls/Turns*	
Bufflehead	*Bucephala albeola*	Herring Gull	*Larus argentatus*
Common Merganser	*Mergus merganser*	Mew Gull	*Larus canus*
Harlequin Duck	*Histrionicus histrionicus*	Glaucous-winged Gull	*Larus glaucescens*
White-winged Scoter	*Melanitta fusca*	Bonaparte's Gull	*Larus philadelphia*
Hawks/Falcon		Arctic Tern	*Sterna paradisaea*
Bald Eagle	*Haliaeetus leucocephalus*	Aleutian Tern	*Sterna aleutica*
Golden Eagle	*Aquila chrysaetos*	*Gallinaceous Birds*	
Northern Harrier	*Circus cyaneus*	Willow Ptarmigan	*Lagopus lagopus*
Merlin	*Falco columbarius*	White-tailed Ptarmigan	*Lagopus leucurus*
Peregrine Falcon	*Falco peregrinus*	Spruce Grouse	*Canachites canadensis*
American Kestrel	*Falco sparverius*	Rusty Blackbird	*Euphagus carolinus*
Red-tailed Hawk	*Buteo jamaicensis*	Black-capped Chickadee	*Poecile atricapillus*
Rough-legged Hawk	*Buteo lagopus*	Boreal Chickadee	*Poecile hudsonicus*
Sharp-shinned Hawk	*Accipiter striatus*	American Dipper	*Cinclus mexicanus*
Northern Goshawk	*Accipiter gentilis*	American Robin	*Turdus migratorius*
Kingfisher		Varied Thrush	*Ixoreus naevius*
Belted Kingfisher	*Ceryle Alcyon*	Hermit Thrush	*Catharus guttatus*
Woodpeckers		Swainson's Thrush	*Catharus ustulatus*
Hairy Woodpecker	*Picoides villosus*	American Pipit	*Anthus rubescens*

Common Name	Scientific Name	Common Name	Scientific Name
Three-toed Woodpecker	*Picoides tridactylus*	Bohemian Waxwing	*Bombycilla garrulus*
Downy Woodpecker	*Picoides pubescens*	Orange-crowned Warbler	*Vermivora celata*
Black-backed Woodpecker	*Picoides arcticus*	Blackpoll Warbler	*Dendroica striata*
Northern Flicker	*Colaptes auratus*	Yellow Warbler	*Dendroica petechia*
Owls		Yellow-rumped Warbler	*Dendroica coronata*
Northern Saw-whet Owl	*Aegolius acadicus*	Northern Waterthrush	*Seiurus noveboracensis*
Boreal Owl	*Aegolius funereus*	Wilson's Warbler	*Wilsonia pusilla*
Short-eared Owl	*Asio flammeus*	Pine Grosbeak	*Pinicola enucleator*
Great Horned Owl	*Bubo virginianus*	Dark-eyed Junco	*Junco hyemalis*
Great Gray Owl	*Strix nebulosa*	Brown Creeper	*Certhia americana*
Northern Hawk Owl	*Surnia ulula*	White-winged Crossbill	*Loxia leucoptera*
Jays/Magpies/Crows		Rock Dove	*Columba livia*
Common Raven	*Corvus corax*	Alder Flycatcher	*Empidonax alnorum*
Gray Jay	*Perisoreus canadensis*	Olive-sided Flycatcher	*Contopus cooperii*
Black-billed Magpie	*Pica pica*	Western Wood-Pewee	*Contopus sordidulus*
Northwestern Crow	*Corvus caurinus*	Steller's Jay	*Cyanocitta stelleri*
Songbirds		Golden-crowned Kinglet	*Regulus satrapa*
Tree Swallow	*Tachycineta bicolor*	Red-breasted Nuthatch	*Sitta canadensis*
Violet-green Swallow	*Tachycineta thalassina*	Common Redpoll	*Carduelis flammea*
Bank Swallow	*Riparia riparia*	Hoary Redpoll	*Carduelis hornemanni*
Cliff Swallow	*Hirundo pyrrhonota*	Pine Siskin	*Carduelis pinus*
Northern Shrike	*Lanius excubitor*	American Tree Sparrow	*Spizella arborea*
Savannah Sparrow	*Passerculus sandwichensis*	Fox Sparrow	*Passerella iliaca*
Lincoln's Sparrow	*Melospiza lincolnii*	Golden-crowned Sparrow	*Zonotrichia atricapilla*
Lapland Longspur	*Calcarius lapponicus*	Gray-cheeked Thrush	*Catharus minimus*
White-crowned Sparrow	*Zonotrichia leucophrys*	Townsend's Warbler	*Dendroica townsendi*
Song Sparrow	*Melospiza melodia*	Ruby-crowned Kinglet	*Regulus calendula*
Sources: Selkregg, 1974; AOU, 1997			

Trumpeter swans pair for life, usually at 2 years of age, but may wait up to 5 years to begin breeding (ADF&G, 1994). They begin breeding as soon as spring thaw permits. The female usually lays between two and seven eggs. The young, called cygnets, hatch after 31 to 35 days of incubation. During incubation, the male swan undergoes wing feather molt which leaves him flightless for about a month. The male and female guard the cygnets for the next 11 to 13 weeks until they fledge (are able to fly). It is during this period that the female completes her molt.

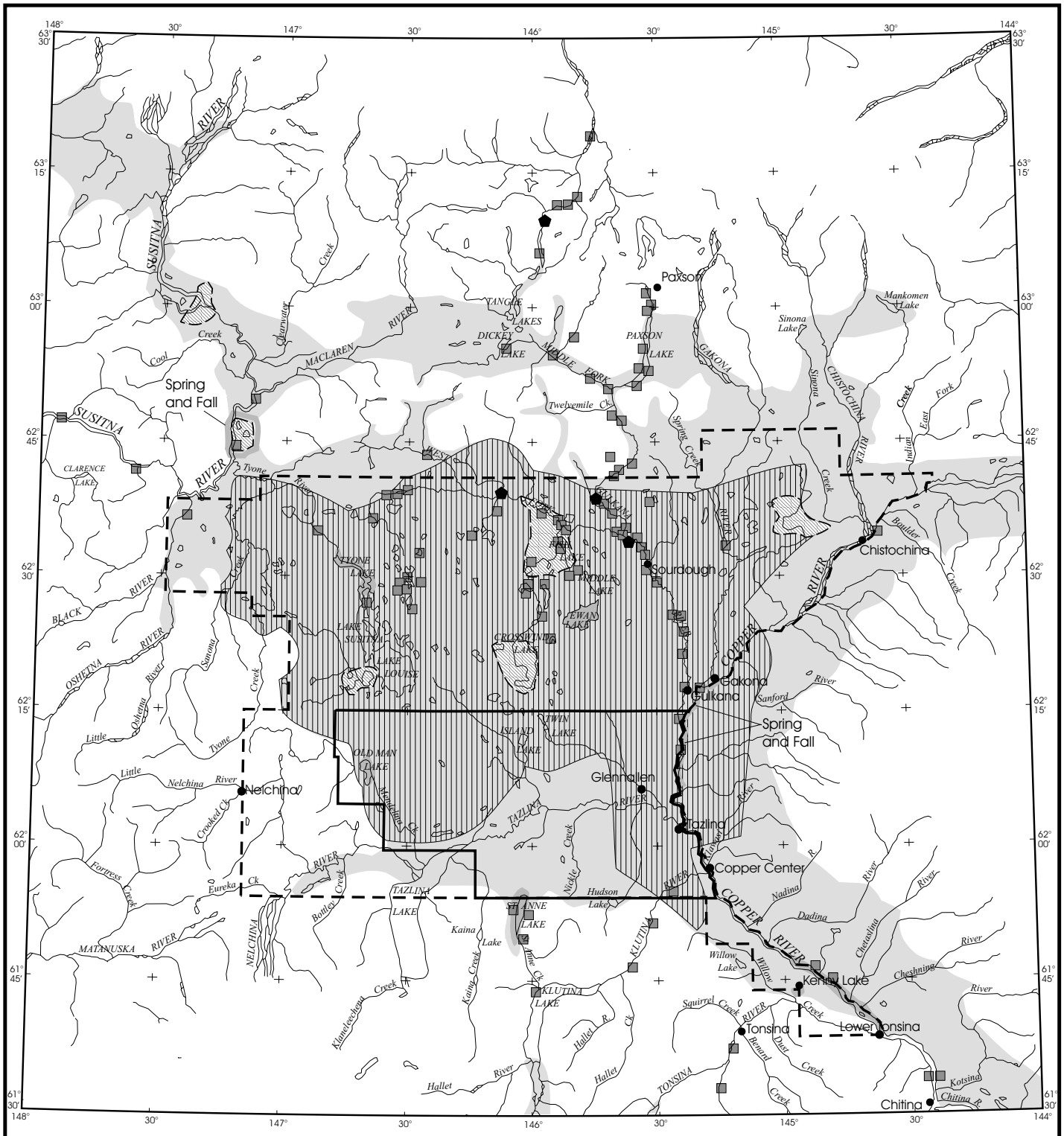

FIGURE 3.2 Important Bald Eagle and Trumpeter Swan Habitat

Trumpeter swans leave the Copper River basin in mid-September to early October. Large numbers stage at Old Man, Crosswind, and Ewan Lakes prior to the fall migration (Alaska, 1982; ADF&G, 1985b; Westlund - Pers. Comm., 1999), and may be concentrated in the area through November 15.

Numerous waterfowl species (other swans, geese, ducks, etc.) also nest within the study area and, following the nesting season, waterfowl molt prior to migrating south. Wetlands in the study area are used as molting habitat by waterfowl species that nest in the area during the summer (ADF&G, 1985b). A majority of the ducks and other waterfowl leave the Copper River basin during late September and early October. Important duck and geese habitat is depicted in Figure 3.3.

Bald eagles occur in the Copper River basin on a seasonal basis, and are generally present from April through October (Alaska, 1982). Relatively large numbers of eagles nest in this region, with a majority of nest sites located along river corridors and around large lakes. Specific nest sites within, or adjacent to, the study area have not been identified. Bald eagles and their nests are currently protected under federal law. See Figure 3.2.

Many of the songbirds that occur in the study area in the summer are neotropical migrants that nest in Alaska and winter in Latin America. Trend data in recent years has indicated that populations of these birds are in decline in North America, although local data is often insufficient to determine local trends (BPIF, 1999). Populations of neotropical migratory birds are experiencing threats from a number of factors, including habitat loss within their breeding and wintering ranges and at migration stop-over areas, severe weather, and nest parasitism.

The U.S. Fish and Wildlife Service (USFWS) has identified several of these songbird species as Migratory Nongame Birds of Management Concern, based on declining population trends. The state of Alaska has also listed several songbird species under the designation of Species of Special Concern. The state of Alaska's list of Species of Special Concern includes species of fish or wildlife native to Alaska that have entered a long-term decline in abundance or are vulnerable to a significant decline due to low numbers, restricted distribution, dependence on limited habitat resources, or sensitivity to environmental disturbance. In the study area, the olive-sided flycatcher (Contopus cooperii), grey-cheeked thrush (Caltharus minimus), Townsend's warbler (Dendroica townsendi), and blackpoll warbler (Dendroica striata) are presently listed as a Species of Special Concern by the state of Alaska (Andres - Pers. comm., 1999).

Two of the three subspecies of the peregrine falcon, the American and Arctic (Falco peregrinus anatum and F. p. tundrius), migrate through, but are not known to nest in, the study area. However, information about nesting within the Copper River basin is spotty and some American peregrine falcons may exist within the study area (Swem - Pers. Comm., 1999). The Arctic subspecies was removed from the federal list of endangered species in 1994 (59 FR 50796) and the American subspecies was removed in 1999 (64 FR 46541). Although both subspecies have been delisted, the USFWS is required to monitor the population for a minimum of 5 years under the Endangered Species Act.

Peregrine falcons that nest in Alaska generally winter in South America, while those that nest at lower latitudes exhibit variable migratory behavior, and some are non-migratory. Peregrine falcons feed primarily on other birds, such as songbirds, shorebirds, and ducks. Flying high above their intended prey, peregrines will "stoop" or dive and strike in mid-air, killing the prey with a sharp blow (USFWS, 1999).

Peregrine falcons generally reach breeding maturity at two years of age. An average clutch of four eggs is laid in the spring, hatching about a month later. Peregrines vigorously defend their nests, although they may abandon them if severely or continuously harassed. The nest is usually a scrape or depression dug in gravel on a cliff ledge. Rarely, peregrines will nest in a tree cavity or an old stick nest (USFWS, 1999).

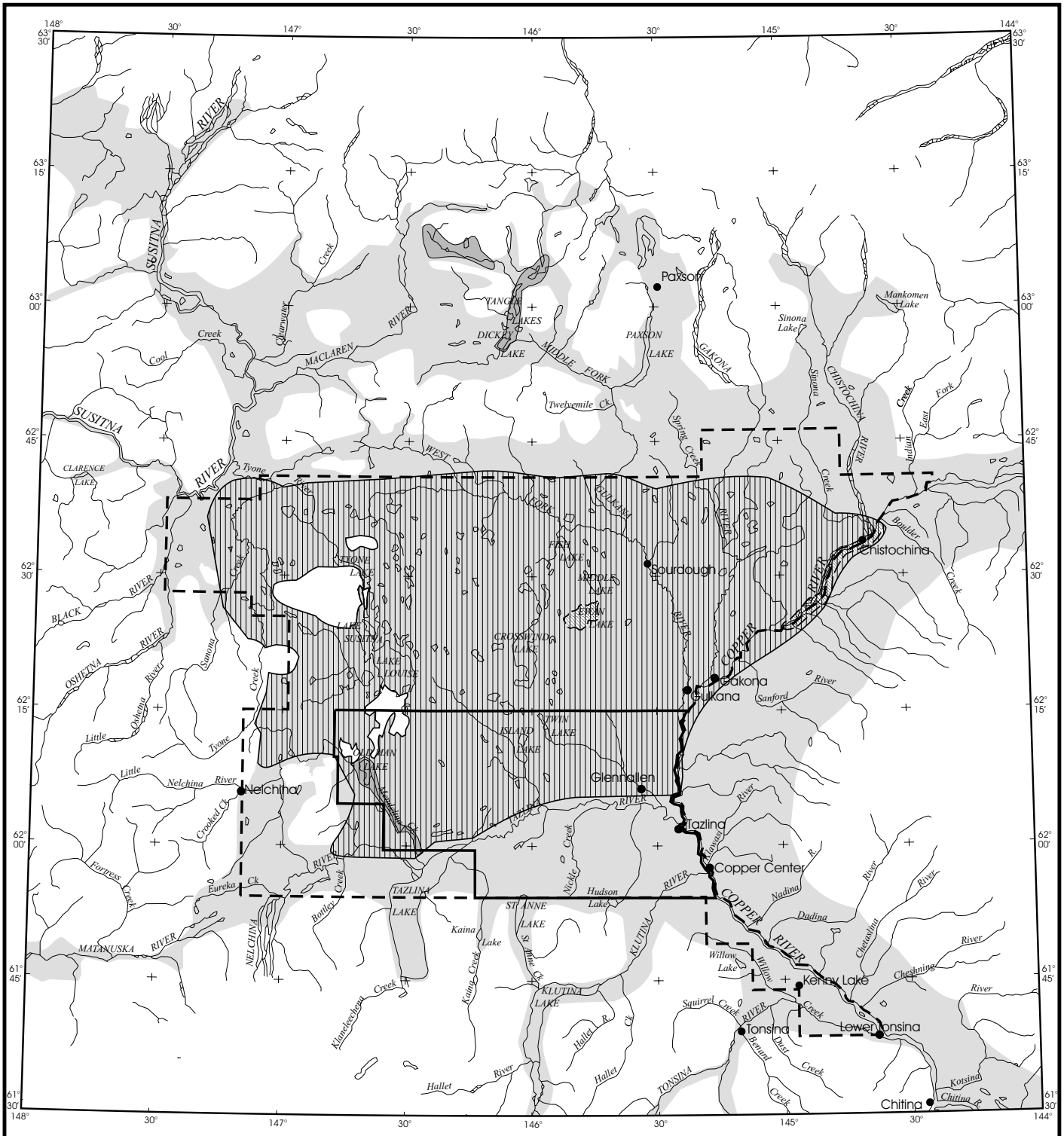

FIGURE 3.3 Important Duck and Geese Habitat

Study Area =

License Area =

General Distribution =

Known Concentration Areas:

Nesting =

Spring =

Fall =

Source: ADF&G, 1985

SCALE 1:1,000,000 One Inch = 17.5 Miles Approx.

5 0 5 10 15 20 25

Miles

Albers Equal-Area Conic Projection, 1927 North American Datum, Clarke 1866 ellipsoid.

ADNR 5/2000

3. Mammals

Numerous terrestrial mammals inhabit the Copper River basin study area. Several species are of particular importance to the area because of their subsistence and recreational importance. These species include: caribou, moose, black bear, brown bear, numerous furbearers, and other small mammals. A list of mammals generally found in the study area is provided in Table 3.6.

a. Caribou

In Alaska, caribou are distributed into 32 herds (or populations) that utilize separate calving areas throughout the state. One caribou herd, the Nelchina, utilizes land within the study area. The Nelchina Caribou Herd occupies approximately 20,000 square miles in Southcentral Alaska. The Lake Louise Flats and Slide Mountain-Little Nelchina River areas have historically provided important fall and winter habitat for this herd. The Nelchina Herd has recently extended its winter range eastward to near the Canadian border. Because of its accessibility and importance to hunters, the Nelchina Herd has been the most intensively studied caribou herd in the state. Status of the herd has been monitored continuously since 1948. During the past 16 years, the

Table 3.6 Mammals Which Could Occur in the Study Area

Common Name	Scientific Name
Common Shrew	Sorex cinereus
Dusky Shrew	*Sorex monticolus*
Little Brown Bat	*Myotis lucifigus*
Least Weasel	*Mustela nivalis*
Short-tailed Weasel (Ermine)	*Mustela erminea*
Mink	*Mustela vison*
Martin	*Martes americana*
River Otter	*Lontra canadensis*
Arctic Ground Squirrel	*Spermophilus parryii*
Red Squirrel	*Tamiasciurus hundsonicus*
Northern Flying Squirrel	*Glaucomys sabrinus*
Beaver	*Castor canadensis*
Northern Redbacked Vole	*Cleithrionmys rutilus*
Meadow Vole	*Microtus pennsylvanicus*
Muskrat	*Ondatra zibethicus*
Porcupine	*Erethizon dorsatum*
Snowshoe Hare	*Lepus americanus*
Wolverine	*Gulo gulo*
Wolf	*Canis lupus*
Coyotes	*Canis latrans*
Lynx	*Lynx canadensis*
Red Fox	*Vulpes vulpes*
Black Bear	*Ursus americanus*
Brown Bear	*Ursus arctos*
Caribou	*Rangifer tarandus*
Moose	*Alces alces*

Source: Selkregg, 1974

population of the Nelchina Herd has fluctuated considerably. In 1965, the herd consisted of 60,000 to 70,000 caribou, then the population declined to less than 10,000 by the early 1970s. Intensive management resulted in an increase in herd size to approximately 18,000 to 19,000 caribou by 1980. The 1997 post-rut estimate for the Nelchina Herd was 31,893 caribou (Hicks, 1998a). Important caribou habitat is depicted in Figure 3.4.

The Nelchina Herd has utilized several winter ranges in the past 30 years, but the traditional calving grounds have remained largely unchanged. Calving generally takes place between May 15 and June 10, in an area immediately to the west of the study area in the Talkeetna Mountains (ADF&G, 1985a). Most adult cows give birth to a single calf (twins are rare). Newborn calves weight an average of 13 pounds and may double their weight in 10 to 15 days (ADF&G, 1994). After calving, caribou collect into large post-calving aggregations to avoid mosquitoes, biting flies, and predators. The herd migrates to the mountains or along windy valleys where protection can be found from insects. After insect numbers have declined in late August, caribou scatter out to feed heavily on willow leaves and mushrooms to regain body weight. Caribou must keep moving to find adequate food, and herds travel long distances between summer and winter ranges.

In 1997, the Nelchina Herd concentrated in the eastern Talkeetna Mountains during the summer. During fall 1997, the herd was located at interior portions of Game Management Unit (GMU) 13, west of the Richardson Highway and south of the Denali Highway, just north of the study area. Radio-collared animals were distributed within a band extending from the eastern Talkeetna Mountains across the Lake Louise Flats south of the Alphabet Hills to the Gulkana River, which is included in the study area (Hicks, 1998a). Migration routes to traditional calving grounds vary, depending on where the caribou winter. In 1997-98, the herd wintered in GMUs 12 and 20E, northeast of the study area. During calving in 1998, a large number of cows calved in the Little Nelchina River, further south than the usual calving area.

b. Moose

Moose occur throughout the proposed Copper River basin study area and provide significant hunting opportunities in Southcentral Alaska. Moose numbers in the vicinity (i.e., GMU 13) declined an estimated 25 to 30 percent during 1988-91, and current numbers are still well below numbers observed in the late 1980s (Hicks, 1998b). Important moose habitat is depicted in Figure 3.5.

Moose occupy a variety of habitats at different times of the year, making seasonal movements for calving, rutting, and wintering areas. During summer, high concentrations of moose occur in subalpine areas, particularly in the Talkeetna Mountains. The area to the west of Moose Lake, immediately adjacent to the study area, also supports relatively high numbers of moose during the summer. Snow cover forces a majority of the moose down to lower elevations during the winter, restricting them to limited winter ranges. In the study area, the Little Nelchina River drainage and land to the north of Slide Mountain provide critical moose wintering habitat. In November 1980, 246 moose were counted in the general vicinity north of Slide Mountain in a single day (Alaska, 1982). Moose breed in the fall, usually between September and early October, and calving takes place from about May 23 to June 15. Specific calving areas have not been identified in this region, but numerous young calves have been observed in the Talkeetna Mountains to the west of the study area. Cows give birth to twins 15 to 75 percent of the time, and triplets may occur once in every 1,000 births (ADF&G, 1994). During spring, as the snow recedes and browse becomes available in subalpine areas, moose generally return to higher elevations (Alaska, 1982).

Moose consume a wide range of foods. During the spring and summer, food generally consists of sedges, horsetail (Equisetum spp.), pondweeds, grasses, forbs, and the leaves and branches of birch, willow, and aspen (ADF&G, 1994).

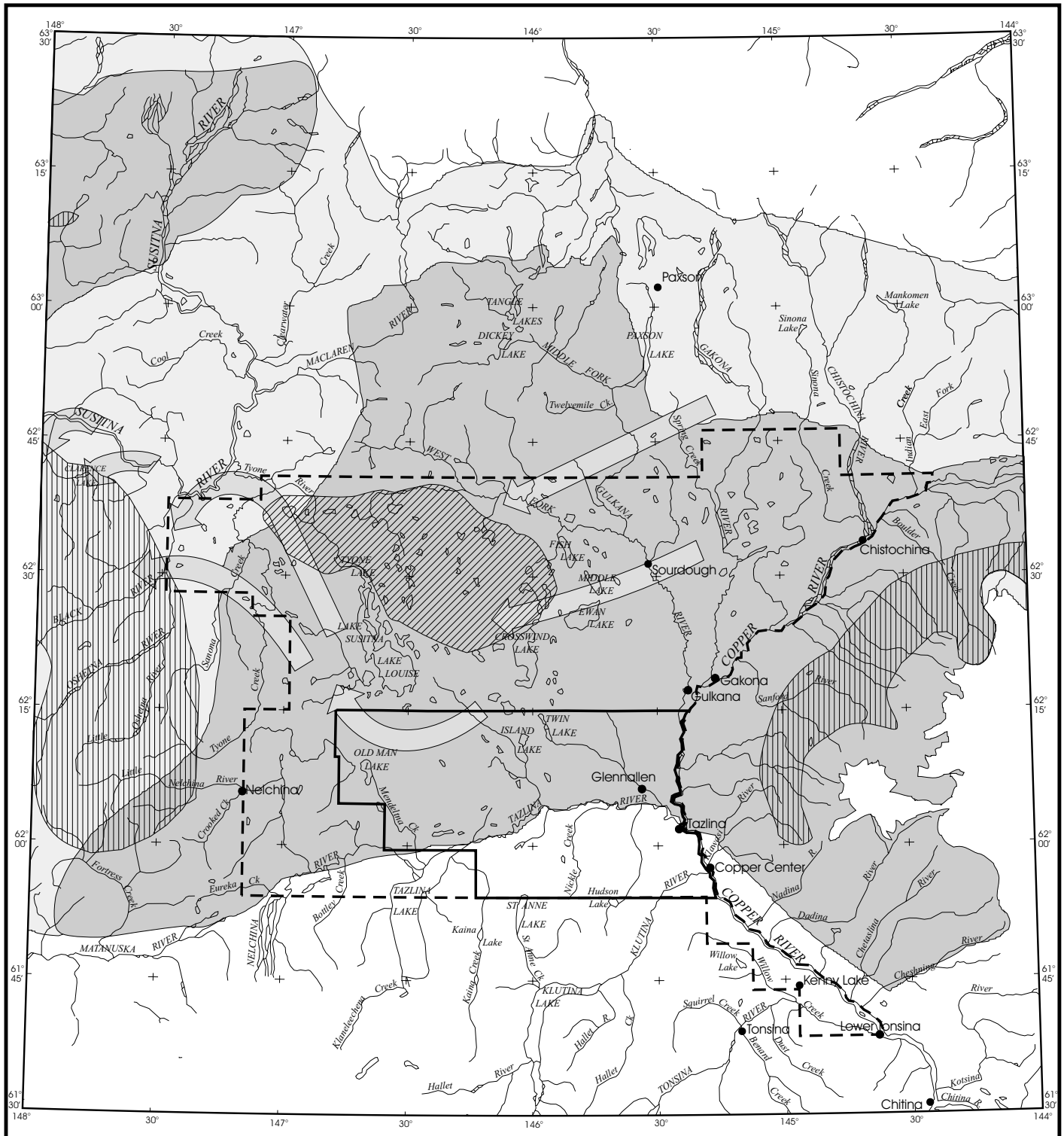

FIGURE 3.4 Important Caribou Habitat

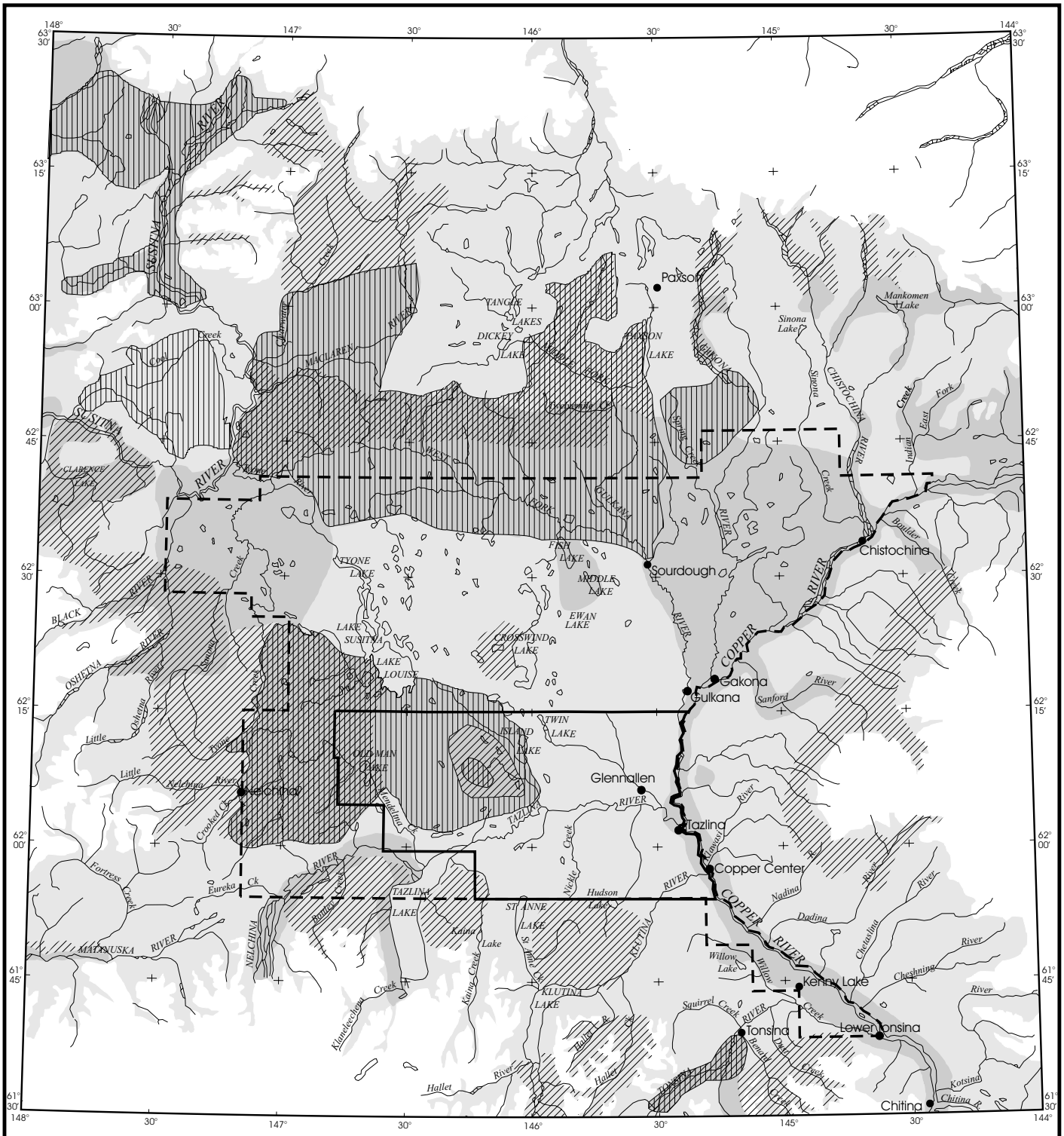

FIGURE 3.5 Important Moose Habitat

c. Bears

Black and brown bears occur within the study area. Specific information on critical habitats is limited, although basic behavior patterns have been documented. Black bear distribution coincides closely with that of forested areas. Semi-open forests with an understory of grasses, herbs, and fruit-bearing shrubs, are especially attractive to black bears. Brown bears utilize all habitat types, but grass communities appear to be the most important, particularly in spring. Brown bears frequent meadows, muskegs, sedge flats, and grassy areas interspersed within forests. Important bear habitat is depicted in Figure 3.1.

Black bears generally emerge from their dens between the first of April and mid-May. Boars emerge about a week prior to sows and cubs. Brown bears emerge from their dens beginning in late April, although females with newborn cubs may not emerge until late May. After emerging from their dens, both species move to lower elevations where they feed on early-growing green vegetation. From May to mid-July, horsetail is a particularly important food item for black bears. Black and brown bears generally remain at lower elevations throughout the summer, congregating along anadromous streams to feed on spawning salmon. In the study area, concentrations of both species of bears can be found along Mendeltna Creek during the spawning season. In late summer and fall, black and brown bears shift to alpine and subalpine areas, where they feed on ripened berries.

Black bears generally den in forested areas, excavating their dens at the base of spruce trees. Brown bears seem to prefer eskers as denning sites. Eskers are ridges or knolls of gravelly or sandy drift originally formed by streams within or under glacial ice. They are well-drained and free of permafrost, allowing construction of winter dens. Aspen trees typically grow in these areas and facilitate the identification of eskers, particularly during fall when the leaves turn a brilliant gold color. Denning activities usually commence around the first of October, and most bears will have entered their dens by mid-November (Alaska, 1982; Miller, 1990). No denning concentration areas have been identified within the study area.

Black and brown bears mate anytime between May through July, with most of the activity occurring in June. Apart from mating, bears are solitary animals except for sows with cubs. Cubs are born in the den during mid-winter following a seven-month gestation period. One to four cubs are usually born, with two being most common. Both black and brown bear cubs usually remain with the mother for two years before separating, after which the female will breed again and produce a new litter (ADF&G, 1984).

d. Furbearers and Other Small Mammals

Numerous species of furbearers also inhabit lands within, the study area (Table 3.6). Population estimates are not available for GMU 13. However, in 1990-91, beaver and coyote were considered abundant; lynx, marten, and snowshoe hare were considered less abundant or common; and muskrat and mink numbers were very low (Abbott, 1993). Wolverine were considered abundant in the more remote mountainous regions of each unit. Information from 1996-1997 trapper questionnaires suggested that wolverine, lynx, and snowshoe hare numbers were increasing (Hicks, 1997). Other common furbearers found within the license area include wolves, river otter, ermine, and red fox.

Wolves are common in the study area and throughout the interior of Alaska. The fall 1998 wolf population in GMU 13 was estimated at 500 wolves in 55 packs (B. Tobey - Pers. Comm., 1999). Current population projections for 1999 indicate that the wolf population is increasing and will be the highest recorded since 1975 (Table 3.7). Caribou and moose are major prey for wolves, with Dall sheep also taken when

possible. Wolves have been identified as a major cause of the declining moose and caribou population in the area. Wolf control programs have not been used in the past in the area.

Wolves are highly social animals and usually live in packs that may include parents and pups from several families. Wolves normally breed in February and March, with litters averaging about five pups born in early June (ADF&G, 1994). Female wolves begin breeding at 22 months old. Pups are born in a den excavated as much as 10 feet into well-drained soil. Wolves are carnivores and may travel up to 20 miles from their den in search of prey, which consists mainly of moose and caribou in the winter and small game and birds during the summer.

Table 3.7 Game Management Unit 13 Wolf Population Estimates, 1975 - 1999[1]

Year	Spring Estimate	Average No. Wolves [2]	Fall Estimate	Average No. Wolves [2]	Annual Harvest
1975	254	5.9	426	10.0	110
1976	280	6.5	318	7.4	102
1977	174	4.1	325	7.6	128
1978	124	2.9	261	6.1	69
1979	147	3.4	281	6.6	57
1980	135	3.2	251	5.9	46
1981	114	2.7	199	4.6	54
1982	109	2.5	369	8.6	89
1983	193	4.5	264	6.2	118
1984	119	2.8	280	6.5	127
1985	138	3.2	258	6.0	69
1986	200	4.7	258	6.0	84
1987	160	3.7	290	6.8	109
1988	130	3.0	200	4.7	32
1989	150	3.5	360	8.4	84
1990	285	6.7	400	9.3	145
1991	242	5.7	351	8.2	114
1992	195	4.6	310	7.2	93
1993	210	4.9	400	9.3	179
1994	230	5.3	350	8.1	153
1995	180	4.2	330	7.7	122
1996	220	5.1	400	9.3	141
1997	240	5.6	380	8.8	130
1998	260	6.1	500	11.7	142
1999	300	NA	NA	NA	NA

Note: 1 43,000 km2 of wolf habitat in unit
2 Per 1,000 km
NA = Not Available. Sources: B. Tobey - Pers. comm., 1999

Small mammals commonly found in the study area include: bats, several species of shrews and microtenes, Arctic ground squirrels, red and northern flying squirrels, porcupines, and others (Table 3.6).

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